



Achievement TESTING program

Information Bulletin

• Grade 9 Science •

1999 – 2000 School Year

LB
3054
C22
A3
gr.9
S352
I54
1999/
2000
EDUC



EX LIBRIS UNIVERSITATIS ALBERTENSIS

This document was written primarily for:

Students	✓
Teachers	✓
Administrators	✓
Parents	
General Audience	
Others	✓ Superintendents

Distribution: This document is posted on our web site. Our Internet address is <http://ednet.edc.gov.ab.ca>.

This bulletin contains general information about the Achievement Testing Program and information specific to the Grade 9 Science Achievement Test. **This bulletin replaces all previous bulletins.**

Copyright 1999, the Crown in Right of Alberta, as represented by the Minister of Learning, Alberta Learning, Student Evaluation Branch, 11160 Jasper Avenue, Edmonton, Alberta T5K 0L2. All rights reserved.

Alberta educators may reproduce this bulletin for non-profit educational purposes.

September 1999

Achievement Testing Program Purpose

The purpose of the Achievement Testing Program is to

- determine if students are learning what they are expected to learn
- report to Albertans how well students have achieved provincial standards at given points in their schooling
- assist schools, jurisdictions, and the province in monitoring and improving student learning

Enhance Student Learning

Careful examination and interpretation of the results can help identify areas of relative strength and weakness in student achievement. Teachers and administrators can use this information in planning and delivering relevant and effective instruction in relation to learning outcomes in the *Programs of Study*.

Enable Accountability

Alberta Learning and school jurisdiction personnel are responsible for ensuring that high-quality education is provided to all students in the province.

Information about achievement is provided to

- schools and jurisdictions
- parents
- the public

so that they may know how well students in their schools are meeting local targets and provincial expectations.

Interpreting Results

Achievement tests assess only part of what is to be learned. In addition, many factors contribute to student achievement. Personnel at the jurisdiction and school levels are in the best position to appropriately interpret, use, and communicate jurisdiction and school results in the local context.

General Information

The Achievement Testing Program provides teachers, parents, students, school administrators, Alberta Learning, and the public with information about what students know and can do in relation to provincial standards. Group results are reported at school, district, and provincial levels to improve learning opportunities for students.

The assessments are administered in two subject areas in Grade 3—language arts and mathematics—and in four subject areas in grades 6 and 9—language arts, mathematics, social studies, and science.

The assessments are based on provincial standards, which reflect important learnings in the subject areas listed above. Classroom teachers from across the province are extensively involved in developing, field testing, and marking the assessment instruments. Teachers are also involved in setting assessment standards.

Reporting the Results

On August 25, 1999, each jurisdiction and school connected via extranet received, electronically, individual school reports and jurisdiction reports regarding their students' achievement, as well as guidelines for interpreting these results in relation to provincial standards.

To facilitate reflection on school programs, we expect that results will be shared with all school staff (not just teachers of grades 3, 6, and 9), as well as with parents and the community.

Two copies of an individual profile for each student will be sent to the school that the student will attend in September. We expect that the Parent Copy will be given to parents and the School Copy will remain with the student's record.

Administering the Tests

Information about the nature of the provincial assessments as well as their administration to students requiring special provisions can be found in the *General Information Bulletin, Achievement Testing Program*, which is distributed to all school principals and is posted on the Alberta Learning web site <http://ednet.edc.gov.ab.ca>.

Principals should refer to the *Principal's Manual* for specific information regarding schedules, security, rules, responsibilities, policies, and the administration of all achievement tests.

Teachers can refer to the *Teacher's Manual* for specific information regarding procedures for administering all achievement tests and the local marking of the written response for Language Arts achievement tests.

Students in Francophone and French Immersion Programs

All students in Francophone and French Immersion programs must write English Language Arts, French Language Arts, and French versions of other achievement tests if their language of instruction is French. Alberta Learning will send a checklist to schools in January requesting an indication of how many English or French tests are required. These forms must be returned through jurisdiction offices by mid-February.

**The following achievement tests are secured:
ALL tests from 1998 and 1999**

Standards: Curriculum, Assessment, Achievement

Definitions

The Achievement Testing Program is directly concerned with three different but related standards. These provincial standards are curriculum standards, assessment standards, and achievement standards.

- **Curriculum Standards** are the expected student learnings sequenced into grade levels. They include broad statements of knowledge, skills, and attitude expectations against which student performance is judged. These standards are established in the process of curriculum development and are found in the *Programs of Study* document produced for each subject.
- **Assessment Standards** are the criteria adopted for judging actual student achievement relative to curriculum standards. They are ultimately expressed in and applied to test scores. They are derived from answers to questions such as: what scores must a student obtain or how many questions on a given test must a student answer correctly in order for his/her performance on the test to be judged as acceptable or excellent?
- **Achievement Standards** are judgements that specify what percentages of students are expected to achieve an acceptable and an excellent level of achievement in relation to each course of studies; i.e., to the relevant curriculum standards. They reflect a community judgement about what is an appropriate expectation for students. It is important to point out that this judgement is not a prediction of the percentage of students who will actually achieve acceptable or excellent levels, but rather a specification of the percentage of students at a given grade or year in school

who are *expected* to achieve the acceptable (85%) or excellent level (15%). **The 85% of students expected to meet the acceptable standard includes those students who meet the standard of excellence.** These standards apply to school, jurisdiction, and provincial performance.

Local Targets and Planning

A target is an implicit part of any goal. A school's educational goals point the directions for people's efforts, but targets describe in specific terms what will be accomplished by a certain time. This allows people to assess whether they are heading where they intend to go, and how well they are moving toward their desired outcomes. Assessment of progress in relation to a target may also lead to the recognition that a different target would be more helpful in guiding a school's or jurisdiction's efforts toward a particular goal. By identifying immediate, reachable outcomes, targets encourage teachers, students, administrators, and their community to believe that distant goals are attainable.

Viewed in this way, targets can be a valuable part of a school board's education plan. The mission, mandate, values and beliefs, and long-range goals all provide a context for setting specific targets. Similarly, past accomplishments are helpful indicators of what specific targets may be most appropriate. This is why achievement test results, as well as results of various other local assessments, are relevant in target setting.

Focus

District targets for student achievement on the provincial achievement tests are a required part of a school board's education plan. These district targets provide a framework for each school in the district to use in setting local targets. However, the setting of specific targets by each school is necessary as part of a plan of action and as a

basis for assessing the effectiveness of local decisions about programs. District targets will be most helpful if they reflect the variations identified by the local targets set by individual schools.

Systematic interpretation of school results from provincial achievement tests will reveal where students need more help in order to continue learning successfully. This can be the beginning point for setting local targets for student performance on the tests in the next year or two. The provincial expectation that at least 85% of students will achieve the *acceptable standard* on each test indicates the long-term goal, but staff in each school should identify what percentage of their students reasonably can be expected to achieve the provincial standard on a particular test in a given year. An important part of this decision is agreeing on how resources and people can support the priorities that have been set locally.

Tips for Setting Local Targets

- Consider past and desired participation rates in achievement tests when setting targets for student performance on specific tests.
- Focus on a limited number of areas. For example, emphasize one or two subjects in which weaknesses in student performance are across grades. It may be reasonable to set “hold the line” targets in other areas temporarily.
- Work collaboratively across grades in a school. Students’ performance on an achievement test reflects their learning over the years. Teachers in all grades can contribute important insights and assistance in setting targets.
- Use the school reports on achievement test results to identify which aspects of a subject need attention, and use this information to plan targets.
- Emphasize what students need in order to succeed, rather than focusing on problems that keep students from achieving at the levels expected provincially.

- Expect to set different targets in different grades and subjects, depending on past results and current priorities and resources.
- Work collaboratively at the district level, to identify areas of common strength or weakness across different schools and to determine targets for the district that can support all schools.
- Interpret targets for students so that they are part of the school-wide effort to achieve school targets. Inform parents, too.
- Report to students and parents on student achievement in relation to targets.

Targets in Perspective

Provincial tests, though providing a common standard and important information about students’ learning, are only one of many indicators that should be used to evaluate the effectiveness of schools. School boards and individual schools may find it helpful to set targets related to other measures of student achievement and to areas other than student achievement. Examples of these include completion of programs, satisfaction reported by students or parents, collaboration of parents or others from the community, student involvement in the community, and other types of indicators reflecting local educational goals.

Through its targets, each school board or school, together with parents and members of the community, can highlight priorities that exist locally for a given year and can commit to achieving certain results. Insofar as target setting complements other strategies for improving student learning, targets are likely to contribute to student learning and to the overall effectiveness of schooling in the community.

Purpose of Assessment Standards

The provincial standards are the basis upon which we assess how well students have learned English Language Arts and Mathematics by the end of Grade 3, and English Language Arts, Mathematics, Science, and Social Studies by the end of

Grade 6 and Grade 9. These standards reflect the essential learnings that all Alberta students are expected to achieve. Provincial standards are useful, therefore, for assessing grades 3, 6, and 9 students in all types of school programs—public, private, and home education. By comparing actual results with provincial standards, decisions can be made about whether achievement is, in fact, “good enough.”

Contents

Grade 9 Science Assessment	1
General Description	1
Reporting Categories	1
Description of the Science Assessment Standards	2
Acceptable Standard	2
Standard of Excellence	2
Blueprint	3
 Preparing Students for the Science Test	3
Suggestions for Answering Multiple-Choice and Numerical-Response Questions	3
Sample Test	4
Sample Instructions	5
Sample Answer Sheet for Multiple-Choice Questions	8
Sample Questions	9
Key and Descriptors for Sample Questions	22
 Student Evaluation Branch Contacts	23



Digitized by the Internet Archive
in 2015

Grade 9 Science Assessment

General Description

The Grade 9 Science Achievement Test consists of 55 machine-scored questions: 50 multiple-choice questions, each with a value of one mark, and 5 numerical-response questions, each with a value of one mark. The five numerical-response questions are integrated within the multiple-choice questions.

Students record their answers on a separate answer sheet.

The test is developed to be completed in 75 minutes; however, students may take an additional 30 minutes to complete the test. We suggest that those students who finish writing before one hour has elapsed remain at their desks to review their answers.

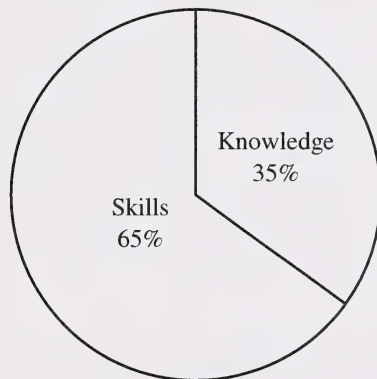
Students require HB pencils and erasers, and a calculator is recommended. See the link for the *Use of Calculators on Alberta Learning Achievement Tests*.

Reporting Categories

This assessment is based on science learnings within which the nature of science, technology, and society are integrated components.

Knowledge and skill components are integrated in the assessment. Knowledge is the fundamental understanding of the concepts and the processes of science. Skills refer to the application of knowledge.

The following circle graph shows the approximate emphasis for the reporting categories of knowledge and skills.



The skills reporting category consists of:

- inquiry skills
- technological problem-solving skills
- societal decision-making skills

Questions on the assessment will have contexts drawn from the following topics:

Diversity of Living Things
Fluids and Pressure
Heat Energy: Transfer and Conservation
Electromagnetic Systems
Chemical Properties and Changes
Environmental Quality

Description of the Science Assessment Standards

The following statements describe what is expected of Grade 9 students who are meeting the *acceptable standard* or the *standard of excellence* based on outcomes in the Program of Study. These statements represent the standards against which student achievement is measured. It is important to remember that one test alone cannot measure completely all of the outcomes in the Program of Study.

Acceptable Standard

Students who meet the *acceptable standard* in Grade 9 Science have a basic understanding of the conceptual and procedural knowledge that is essential to the junior high Science program. For example, they can easily apply concepts and basic procedures to simple and familiar situations, but they may be challenged when applying these concepts and procedures to unfamiliar or complex situations. Students can identify the name of an organism in a classification system, for example, but they may have difficulty interpreting the relationship of organisms at the same classification level.

To meet the *acceptable standard*, students are expected to know how to apply higher level thinking skills to familiar situations. However, students may have difficulty applying these skills in new or unfamiliar situations. For example, they can predict the effects of linking a familiar and identical electrical load in series or parallel circuit, but they may have difficulty predicting the effects of linking different or unfamiliar types of electrical loads in these circuits. They can use basic skills to show what they know and can do in novel, real-life problems that are simple or that require single-step solutions. Also, they can apply more advanced skills or follow multistep procedures to solve familiar real-life problems in which they have had prior experience. For example, in a problem-solving activity to find the best insulating material, these students will be able to develop a simple and controlled procedure, collect a set of data, and determine the best insulator. However, their procedures will likely not have more than one manipulated variable and may lack a complete and logical explanation of results.

Students who meet the *acceptable standard* generally have a positive attitude toward learning about the world in which they live. They appreciate how science and technology affect them on a day-to-day basis. They are skilled in using the basic procedures of science inquiry, technological problem solving, and societal decision making; however, they may have difficulty with the application of more advanced skills and they may have limited ability to make connections between science, technology, and society.

Standard of Excellence

Most students who meet the *standard of excellence* in Grade 9 Science have an exceptional understanding of the conceptual and procedural knowledge outlined in the *Program of Studies*. They can quickly and confidently apply this knowledge in complex and novel situations. For example, not only can they identify the abiotic factors that affect the health and distribution of living things, but also they can predict the possible outcomes of changing abiotic factors on living things and evaluate their effects on the quality of the environment.

These students are expected to be able to apply higher-level thinking skills to unfamiliar situations. In addition, they can easily and quickly solve problems that they have direct experience with and that require single-step or multistep solutions. These students can solve a problem in more than one way and can see more than one solution for some problems. For example, not only are they familiar with the basic operation of an electric motor, but also they can troubleshoot an inoperative motor, make design changes to meet various performance criteria, and construct a working motor. Their problem-solving approach may involve more than one manipulated variable and include logical explanations of procedures and results.

Students meeting the *standard of excellence* have a positive attitude about science and its role in their world. They are curious, open-minded, creative, and confident. In addition, they are persistent problem-solvers and have the ability to view a situation from a number of perspectives. Not only do they have a high level of awareness and understanding of how science and technology affect them personally, but also they can translate this understanding and awareness to societal issues. They are skilled in using the basic procedures of science inquiry, technological problem solving, and societal decision making. They can successfully use advanced skills and make connections between science, technology, and society.

Blueprint

The knowledge and skills reporting categories as well as the emphasis for each topic are presented in the following blueprint.

Topic	Reporting Category Emphasis By Number of Questions* (%)		Total Number of Questions (%)
	Knowledge	Skills	
Diversity of Living Things	4 (7)	6 (11)	10 (18)
Fluids and Pressure	3 (6)	7 (13)	10 (19)
Heat Energy: Transfer and Conservation	3 (6)	4 (7)	7 (13)
Electromagnetic Systems	3 (5)	6 (11)	9 (16)
Chemical Properties and Changes	3 (6)	6 (11)	9 (17)
Environmental Quality	3 (5)	7 (12)	10 (17)
Total	19 (35)	36 (65)	55 (100)

* The number of questions on each topic and/or reporting category is approximate.

Preparing Students for the Science Test

The best way to prepare students for writing the achievement tests is to teach the curriculum well and to ensure that children know what is expected. Many of the skills and attitudes that support test writing are in fact good skills and strategies for approaching all kinds of learning tasks.

Have students do the sample questions included in this bulletin. Then, have students share the strategies they used to answer the questions.

Share the following information with your students to help them prepare for the Grade 9 Science Achievement Test.

Suggestions for Answering Multiple-Choice and Numerical-Response Questions

- Before you begin, find out:
 - how much time you have
 - if you can use a calculator
- Ask questions if you are unsure of anything.
- Skim through the whole test before beginning. Find out how many questions there are and plan your time accordingly.
- Do not spend too much time on any one question. Make a note (*or ?) beside the question and go back to it if you have time.
- Read each question carefully, underline key words, and try to think of an answer before looking at the choices.
- Read all the choices and see which one best fits the answer.
- When you are not sure which answer is correct, cross out any choices that are wrong, then pick the choice that is best.

- Guess if you don't know the right answer. Answer all questions—there is no penalty for guessing.
- If time permits, recheck your answers.
- Double check to make sure you have answered everything before handing in the test.
- Notice that the questions on the science test are organized in narrative themes.
- Read the information given using the strategy that works best for you. You should either
 - look at all the information and think carefully about it before you try to answer the questions **OR**
 - read the questions first and then look at the information, keeping in mind the questions you need to answer.
- Make sure you look at all forms of the information given. Information may be given in words, charts, pictures, graphs, and maps.
- When information is given for more than one question, go back to the information before answering each question.
- Check your work when you calculate an answer, even when your answer is one of the choices.

For further suggestions, see *Teaching Students with Learning Disabilities*, Alberta Learning, Special Education Branch, pages LD 122 to 124.

Sample Test

The following sample questions reflect the nature and complexity of the questions that will appear on the Grade 9 Science Achievement Test.

Teachers are encouraged to familiarize their students with the types of questions that will appear on the achievement test by having them work through the sample questions.

This collection of sample questions does not represent the test emphasis as presented in the blueprint.

A sample answer sheet for the numerical-response questions and the multiple-choice questions is provided so that students can familiarize themselves with this form.

For more samples of the various types of multiple-choice and numerical-response questions, refer to previous Grade 9 Science Information Bulletins.

The key and descriptors for the sample questions is found on page 22.

Sample Instructions

- Calculators are recommended but not required.
- Use **only** an **HB** pencil to mark your answer.
- Read each question carefully.
- If you change an answer, **erase** your first mark **completely**.
- Try to answer every question.
- **You may write in this booklet, if you find it helpful. Make sure your answers are placed on the answer sheet.**
- Now turn this page and read detailed instructions for answering multiple-choice and numerical-response questions.

Multiple Choice

- Each question has four possible answers from which you are to choose the **correct** or **best** answer.

Example

This test is for the subject of

- A. mathematics
- B. science
- C. language arts
- D. social studies

Answer Sheet

Ⓐ ● Ⓒ Ⓓ

- Locate the question number on the separate answer sheet provided and fill in the circle that corresponds to your choice.

Numerical Response

- Record your answer on the answer sheet provided by writing it in the boxes and then filling in the corresponding circles.
- Enter the first digit of your answer in the left-hand box and leave any unused boxes blank.

Examples

Calculation Questions and Solutions

A mechanic used a hydraulic press to compress a spring. If the hydraulic press exerts a pressure of 50.0 N/cm^2 and the surface area of the spring is 1.25 cm^2 , the force exerted on the spring is _____ N (newtons).

Record **all four digits** of your answer in the numerical-response section on the answer sheet.

Answer: 62.5 N (newtons)

**Record 62.5 on the
answer sheet —**

6	2	.	5
.			
0	0	0	0
1	1	1	1
2		2	2
3	3	3	3
4	4	4	4
5	5	5	
	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

A block of wood is floating in a pan of distilled water. If $\frac{1}{4}$ of the block remains out of the water, the block has a specific gravity of _____.

Record your answer to the nearest hundredth or two decimal places in the numerical-response section on the answer sheet.

Answer: 0.75

Record 0.75 on the answer sheet →

0	.	7	5
---	---	---	---

0	0	0	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	8	9	9	9	9
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Correct-Order Question and Solution

The following is a list of electrical appliances.

- 1 refrigerator
- 2 oven
- 3 blender
- 4 toaster

When the appliances listed above are placed in alphabetical order, the order is

_____, _____, _____, and _____.

Record all four digits of your answer in the numerical-response section on the answer sheet.

Answer: 3214

Record 3214 on the answer sheet →

3	2	1	4
---	---	---	---

0	0	0	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	8	9	9	9	9
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Selection Question and Solution

The following illustrations are of animals that live in Alberta.



1



2



3



4

Identify each illustration, as numbered above, with its name, as given below.

_____ moose

_____ goat

_____ deer

_____ sheep

Record all four digits of your answer in the numerical-response section on the answer sheet.

Answer: 2431

Record 2431 on the answer sheet →

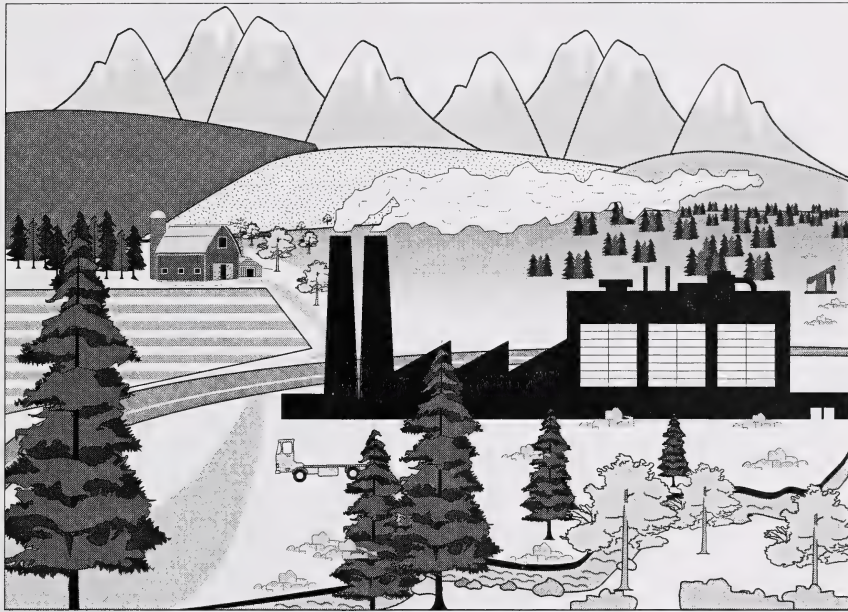
2	4	3	1
---	---	---	---

0	0	0	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	8	9	9	9	9
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Sample Answer Sheet for Multiple-Choice Questions

MULTIPLE CHOICE	
1 (A) (B) (C) (D)	16 (A) (B) (C) (D)
2 (A) (B) (C) (D)	17 (A) (B) (C) (D)
3 (A) (B) (C) (D)	18 (A) (B) (C) (D)
4 (A) (B) (C) (D)	19 (A) (B) (C) (D)
5 (A) (B) (C) (D)	20 (A) (B) (C) (D)
6 (A) (B) (C) (D)	21 (A) (B) (C) (D)
7 (A) (B) (C) (D)	22 (A) (B) (C) (D)
8 (A) (B) (C) (D)	23 (A) (B) (C) (D)
9 (A) (B) (C) (D)	24 (A) (B) (C) (D)
10 (A) (B) (C) (D)	25 (A) (B) (C) (D)
11 (A) (B) (C) (D)	26 (A) (B) (C) (D)
12 (A) (B) (C) (D)	27 (A) (B) (C) (D)
13 (A) (B) (C) (D)	28 (A) (B) (C) (D)
14 (A) (B) (C) (D)	29 (A) (B) (C) (D)
15 (A) (B) (C) (D)	30 (A) (B) (C) (D)

A FERTILIZER PRODUCTION PLANT



A fertilizer production plant uses natural gas to manufacture fertilizer. The plant released a report that explains how it will reduce sulphur oxide emissions from its smokestacks. The plant has easy access to water because it is constructed close to an agricultural region that uses an irrigation system dependent on nearby rivers, canals, and lakes.

Use the following information to answer question 1.

The fertilizer plant is located in an area where the weather is dominated by northwesterly winds (winds from the northwest).

1. The fertilizer plant would **most likely** have the **least** environmental impact on a town if the plant were located
 - A. west of the town
 - B. east of the town
 - C. northwest of the town
 - D. southeast of the town

2. Environmentalists predict that after the plant has been in operation for ten years, the emissions will **most likely**
 - A. raise the pH of the irrigation system's water because of the acidity
 - B. increase the effects of acid rain on the organisms in the area
 - C. reduce the community's concern about environmental quality
 - D. help the corporation improve its public relations image
3. From the perspective of long-term environmental quality, the farmers of the area would be **most** concerned with the
 - A. use of the local transportation system by the corporation
 - B. accidental deaths at the fertilizer plant or gas wells
 - C. availability of cheaper fertilizer from the plant
 - D. release of sulphur oxides from the plant

SCIENCE AND THE CONSTRUCTION INDUSTRY

The Envirosafe Construction Company has been awarded a contract to construct a divided highway in the Kananaskis Country during the months of March to November. You are a consultant hired by Environment Canada to collect data about the environment. While working on site, you will stay in one of the old bunkhouses.



4. The construction foreman has to decide whether to put a layer of clay or gravel under the campsite. The area will be returned to its natural state after the construction, and you know that clay would be the better material because it
- A. allows water to flow away more quickly
 - B. is easily levelled after construction
 - C. is not as easy to compact as gravel
 - D. stops pollutants from seeping into ground water

Use the following information to answer questions 5 and 6.

While a camp waste pit is being excavated, you notice a white, crystalline substance. You decide to find out what the substance is before removing it. When mixed with water, some of the substance disappears. You pour some of the solution on a plate, and when the liquid evaporates, the crystals reappear.

5. The evidence that the crystalline substance underwent a physical change is that
- A. some of the water turned white
 - B. not all of the substance disappeared
 - C. the change produced heat
 - D. the change could be reversed

Use the following additional information to answer question 6.

Using a resource book, you find the following information on pure substances.

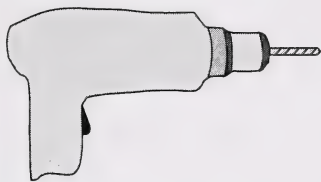
Properties of Some Pure Substances

Substance	Melting Point (°C)	Density (g/cm ³)	Solubility in Water	Appearance
Copper II Sulphate	—	2.3	dissolves	blue solid crystals
Calcium Carbonate	—	2.9	does not dissolve	grey-white solid
Sodium Chloride	801	2.2	dissolves	white solid crystals
Calcium Hydroxide	—	2.2	does not dissolve	white solid

6. The substance that you found is **most likely**
- A. copper II sulphate
 - B. calcium carbonate
 - C. sodium chloride
 - D. calcium hydroxide

Use the following information to answer questions 7 and 8.

To hang some pictures in your bunkhouse, you place a charged battery into your electric drill and then drill a hole in the wall.



7. To which part of the drill do you attach the bit?
- A. Coil
 - B. Armature
 - C. Permanent magnet
 - D. Split-ring commutator
8. Using this drill to make a hole in the wall is an example of converting
- A. chemical energy to potential energy and then to mechanical energy
 - B. chemical energy to electrical energy and then to mechanical energy
 - C. electrical energy to thermal energy and then to electrical energy
 - D. electrical energy to kinetic energy and then to electrical energy
-
9. While you are cooking with the hot plate and toasting a slice of bread, the electric heaters start. Almost immediately, the hot plate, toaster, and electric heaters quit working. This **most likely** happened because
- A. a fuse in the toaster burned out
 - B. a circuit breaker in the electrical panel tripped
 - C. the element in the hot plate burned out
 - D. the circuit breakers in the electric heaters tripped

10. While checking all the fuses and circuit breakers, you notice that in the electrical panel, a 20A fuse has been placed in the circuit designed for a 15A fuse. This is a dangerous situation because
- A. the fuse does not fit properly
 - B. the fuse may cause an electrical shock
 - C. an increase in electrical current may cause the fuse to trip
 - D. an increase in electrical current may cause the wires to overheat
11. The device on an electric heater that controls how much electric current will flow through the electric heater, and therefore how much heat is produced, is called a
- A. resistor
 - B. switch
 - C. variable resistor
 - D. breaker switch
12. The maintenance supervisor asks you to help change the oil in his truck. If it takes 70 seconds for 50 mL of dirty oil to flow out of the engine, the flow rate is
- A. 0.71 mL/s
 - B. 1.4 mL/s
 - C. 20.0 mL/s
 - D. 35.0 mL/s

Use the following information to answer question 13.

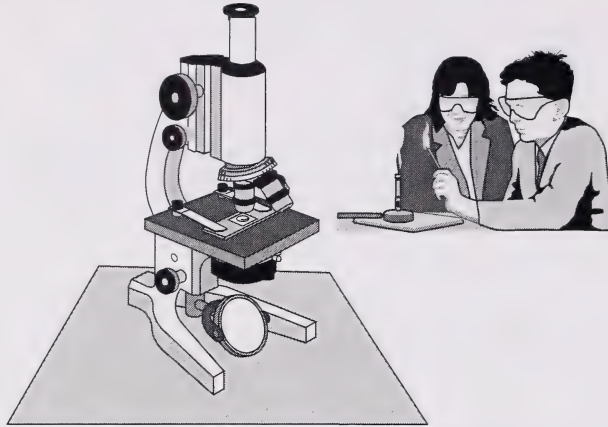
To study the effects of the campsite on the soil, you collected soil samples from four different sites in the camp area before the camp was set up, during the project, and after the campsite was removed. This chart shows the data you collected.

Site	pH Level		
	Before	During	After
1	7.6	7.2	6.6
2	7.8	7.5	6.9
3	7.5	7.4	7.4
4	7.4	6.9	6.5

13. You conclude that the activities at the campsite caused the soil to become
- A. neutral
 - B. more basic
 - C. more acidic
 - D. polluted

SCIENCE RESEARCH AND FIELD STUDIES

You have been hired for the summer to work as an assistant at a science research centre located in southern Alberta. As an assistant, you will perform experiments, work with tradespeople, and collect data in the field.



Use the following information to answer question 14.

While doing research for an experiment on the acidic nature of fruit, you read an information pamphlet about apple production. The pamphlet outlines issues surrounding a spray used on apples grown in Canada. Some people say that the spray may be causing long-term health problems for some people. The fruit growers say they cannot operate their orchards at a profit without the spray.

14. Considering the possible health problems of some people, the **most responsible** action for the fruit growers to take is to shut down the operations of all the orchards immediately until
- A. the people with the long-term health problems get better
 - B. experiments are conducted to determine whether the spray does harm people
 - C. apples can be imported from the United States
 - D. a less-concentrated spray is available on the market

Use the following information to answer question 15.

A researcher at the centre unpacks a box containing four glass vials. The vials are numbered 1, 2, 3, and 4, and each contains a different liquid. The researcher asks you to perform three tests to determine whether the substance in each vial is acidic, basic, or neutral. You make the following observations.

	Test 1	Test 2	Test 3
	Two drops from each vial are placed on a piece of zinc	One drop from each vial is placed on red litmus paper	One drop from each vial is placed on blue litmus paper
Vial 1	gas bubbles appear	no colour change	turns red
Vial 2	no reaction takes place	turns blue	no colour change
Vial 3	no reaction takes place	no colour change	no colour change
Vial 4	gas bubbles appear	no colour change	turns red

15. The liquids in vials 1, 2, 3, and 4 are, respectively,

- A. basic, acidic, neutral, and basic
- B. neutral, basic, acidic, and neutral
- C. acidic, basic, neutral, and acidic
- D. neutral, acidic, basic, and neutral

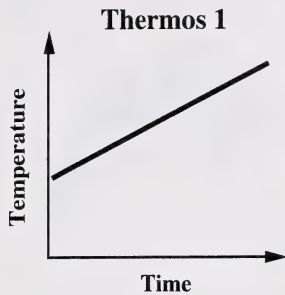
Use the following information to answer questions 16 and 17.

You have been assigned the task of identifying an irregular-shaped piece of metal. Using the displacement method to calculate the volume of the metal, you place it into a graduated cylinder containing 50 mL of water. The new volume is 65 mL. Using a balance scale, you determine the mass of the metal to be 158 g.

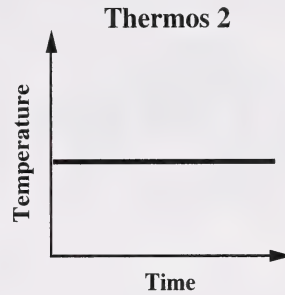
16. The density of the unknown metal is
- A. 0.0949 g/cm³
 - B. 2.43 g/cm³
 - C. 3.16 g/cm³
 - D. 10.53 g/cm³
17. When you place the unknown metal in the graduated cylinder, the weight of the object appears to drop from 1.55 N to 1.40 N. The buoyant force exerted by the water on the unknown metal is
- A. 0.15 N
 - B. 1.40 N
 - C. 1.55 N
 - D. 2.95 N
-
18. After doing a number of experiments involving buoyant force, you recall that as the
- A. density of a fluid increases, the buoyant force decreases
 - B. density of a fluid decreases, the buoyant force increases
 - C. density of a fluid increases, the buoyant force remains the same
 - D. density of a fluid decreases, the buoyant force decreases

19. You test four different coffee thermoses and graph the data for each. The graph that **best** represents the results of a thermos that would keep coffee hot is

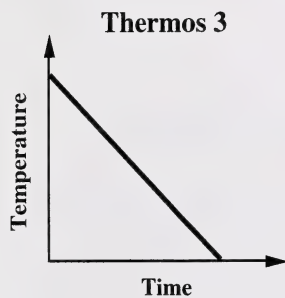
A.



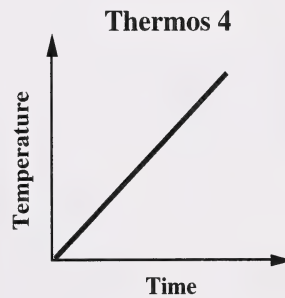
B.



C.



D.



INVESTIGATING NATURE

Use the following information to answer question 20.

To gather information about a nearby stream, you collect data on the following factors.

Some Abiotic and Biotic Factors

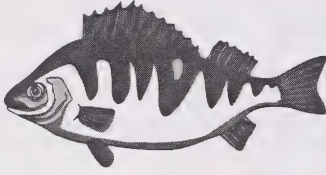
- I** Oxygen content
- II** Undissolved solids
- III** Variety of life forms
- IV** Flow rate
- V** Temperature

20. You decide to research biotic factors first and you know that, of the above factors,

- A. III only is biotic
- B. I and V are biotic
- C. I, II, and IV are biotic
- D. II and III are biotic

Use the following information to answer question 21.

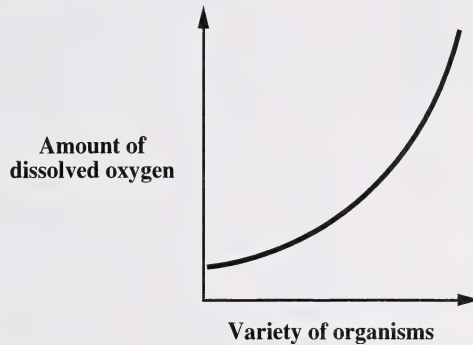
The stream empties into a lake. Within the lake, you observe two different species of fish.



21. The process **most likely** responsible for the development of different species of fish is
- A. artificial selection
 - B. artificial breeding
 - C. selective breeding
 - D. natural selection

Use the following information to answer question 22.

After making more observations about the lake, you sketch a graph of the relationship between the variety of organisms in the water and the amount of dissolved oxygen in the water, as shown below.



22. From this graph, you infer that the variety of organisms will
- A. increase as the amount of dissolved oxygen decreases
 - B. decrease as the amount of dissolved oxygen increases
 - C. increase as the amount of dissolved oxygen increases
 - D. remain the same no matter what the amount of dissolved oxygen may be
-
23. Throughout the day, you observed a number of bees collecting nectar from the wildflowers. You recalled that bees are a species that have several forms adapted to specialized functions within their community. Another example of a species that has specialized functions is
- A. frogs
 - B. ants
 - C. snakes
 - D. dragonflies

Key and Descriptors for Sample Questions

Item	Key	Reporting Category	Topic*	Curriculum Standard
1	D	Skill	EQ	Infer the impact industry will have on the environment
2	B	Skill	CP	Predict the short-term effect of pollution on the environment
3	D	Skill	EQ	Infer the long-term effect of pollution on the environment
4	D	Knowledge	EQ	Infer why a technological solution reduces the impact on the environment
5	D	Knowledge	CP	Recognize the characteristics of physical change
6	C	Skill	CP	Read, interpret, and use a data table to identify a substance
7	B	Knowledge	ES	Know that the armature is the moving part in an electric motor
8	B	Skill	ES	Identify the transfer of energy that occurs in a battery operated drill
9	B	Skill	ES	Analyze an overloaded electric circuit and apply knowledge of circuit breakers
10	D	Knowledge	ES	Analyze an overloaded electric circuit and predict the possible consequences
11	C	Knowledge	ES	Identify a variable resistor as a device that controls the flow of electric current
12	A	Skill	FP	Calculate flow rate, given time and volume
13	C	Skill	EQ	Read, interpret, and use a pH data table to draw a conclusion
14	B	Knowledge	EQ	Interpret descriptive information to determine the most responsible action
15	C	Skill	CP	Interpret observations presented to identify acidic, neutral, and basic solutions
16	D	Skill	CP	Determine and calculate density, given volume displacement and mass
17	A	Skill	FP	Determine and calculate buoyant force, given a change in weight
18	D	Knowledge	FP	Recognize the relationship between density of a fluid and buoyant force
19	B	Skill	HE	Identify the graph that best represents the relationship between time and temperature
20	A	Knowledge	DL	Distinguish between abiotic and biotic factors
21	D	Knowledge	DL	Recognize an example of natural selection
22	C	Skill	DL	Read and interpret a graph to infer the relationship between two variables
23	B	Knowledge	DL	Identify an example of a species that has specialized functions in a community

* DL—Diversity of Living Things
ES—Electromagnetic Systems

FP—Fluids and Pressure
CP—Chemical Properties

HE—Heat Energy
EQ—Environmental Quality

Student Evaluation Branch Contacts

Mailing Address

Student Evaluation Branch
Alberta Learning
11160 Jasper Avenue
Edmonton, AB T5K 0L2

Telephone: 780-427-0010
Toll-free telephone connection: 310-0000
Fax: 780-422-3206
Alberta Learning web site:
<http://ednet.edc.gov.ab.ca>

Questions or comments regarding this bulletin should be directed to:

Greg Hall, Acting Assistant Director
ghall@edc.gov.ab.ca

Don Hollands
Grade 6 and 9 Science Examiner
dhollands@edc.gov.ab.ca

Use of Calculators on Achievement Tests

Rationale

Recent changes in the *Program of Study* for mathematics require students to become familiar with the use of a calculator in order to complete complex computations or verify solutions to problems. The increased availability of technology in schools helps students to solve complex, real-life multistep problems.

Questions on future Grade 9 Mathematics achievement tests will include real-life problems involving more than a single step. Students will need to use a scientific calculator when writing the Grade 9 Mathematics Achievement Test; trigonometric tables will not be provided. Tests are constructed to ensure that the use of particular models of calculators neither advantages nor disadvantages individual students.

Definition

For the purpose of the Achievement Testing Program a scientific calculator is considered to be a handheld device designed for complex mathematical computations. Included in this definition are calculators having the capabilities of performing calculations involving square root, sine, cosine, and tangent. Calculators that have more sophisticated features such as graphing capabilities, built-in formulas, mathematical functions, or other programmable capabilities are included in this definition, but are not required in Grade 9 Mathematics.

Policy

Grade 9: To ensure equity and fairness for all students and compatibility with the provincial *Program of Study*, Alberta Learning **expects** students to use scientific calculators, as defined above, when writing the Grade 9 Mathematics Achievement Test.

Grade 6: Those Grade 6 students for whom the four-function calculator is a familiar classroom tool **are encouraged, but not required**, to use a calculator when writing the Grade 6 Mathematics Achievement Test Part B; however, they **shall not** use calculators when writing Part A.

Grade 3: From their early years in school, students are expected to become increasingly familiar with calculators and confident in using them to solve problems. Nevertheless, students need to have mastered basic addition facts (to 18), subtraction facts (to 18), and multiplication facts (to 49). To respect this principle as well as the problem-solving nature of the new curriculum, there will be two components to the Grade 3 Mathematics Achievement Test. Those students for whom the four-function calculator is a familiar classroom tool **are encouraged, but not required**, to use a calculator when writing the Grade 3 Mathematics Achievement Test Part(ie) B; however, they **shall not** use calculators when writing Part(ie) A.

Procedures

1. Teachers must, at the beginning of the Grade 9 year, advise students that a scientific calculator is **required** when writing the achievement test in mathematics.
2. Grade 9 students should be thoroughly familiar with the calculator that they will use when writing the Grade 9 Mathematics Achievement Test.
3. Although a scientific calculator is not specifically required in Grade 9 science, it may be used by students when writing the Grade 9 Science Achievement Test.
4. Teachers must also advise students in advance that they must clear all information that is stored in the programmable or parametric memory of calculators, both graphing and scientific, that are brought into the achievement test.
5. Calculators that have built-in notes (definitions or explanations in alpha notation) that cannot be cleared are not permitted.
6. Students must not bring to the test external devices that support calculators. Such devices include manuals, printed or electronic cards, printers, memory expansion chips or cards, external keyboards, or any annotations outlining operational procedures for scientific calculators.
7. The type of calculator that Grade 6 students use when writing achievement tests should be consistent with their skills and abilities. A scientific calculator is neither required nor recommended for Grade 6 students.
8. Students may bring extra calculators and batteries into the test room. The school may also provide extra calculators and batteries in case of calculator failure.
9. During achievement tests, supervising teachers must ensure that
 - all calculators operate in silent mode
 - no information is stored in the programmable or parametric memory of the calculators
 - students do not share calculators or the information contained within them
 - calculator cases are stored on the floor throughout the test
 - all test rules are followed
10. If you have any questions or comments about the use of calculators on achievement tests, contact Don Hollands, Science Examiner, or Daryl Chichak, Mathematics Assessment Specialist. Telephone 780-427-0010 or toll-free 310-0000, or fax 780-422-3206, or e-mail dhollands@edc.gov.ab.ca or dchichak@edc.gov.ab.ca.



LRDC

Printed by
Learning Resources
Distributing Centre
Production Division
Barrhead, Alberta
Canada, T7N 1P4

"Reaching Students is What We're About"